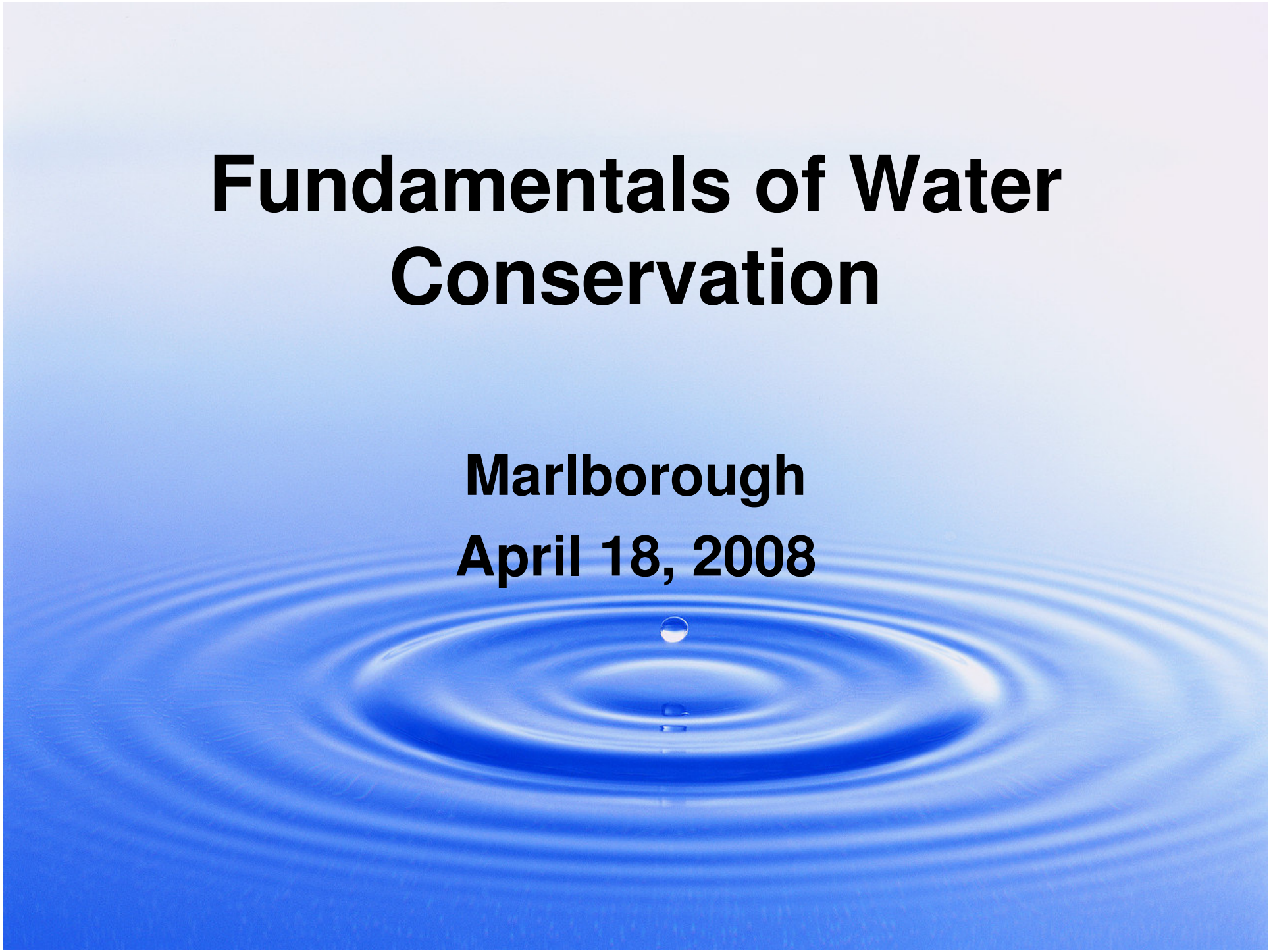
Fundamentals of Water Conservation

Marlborough

April 18, 2008



Non-Process Water Use

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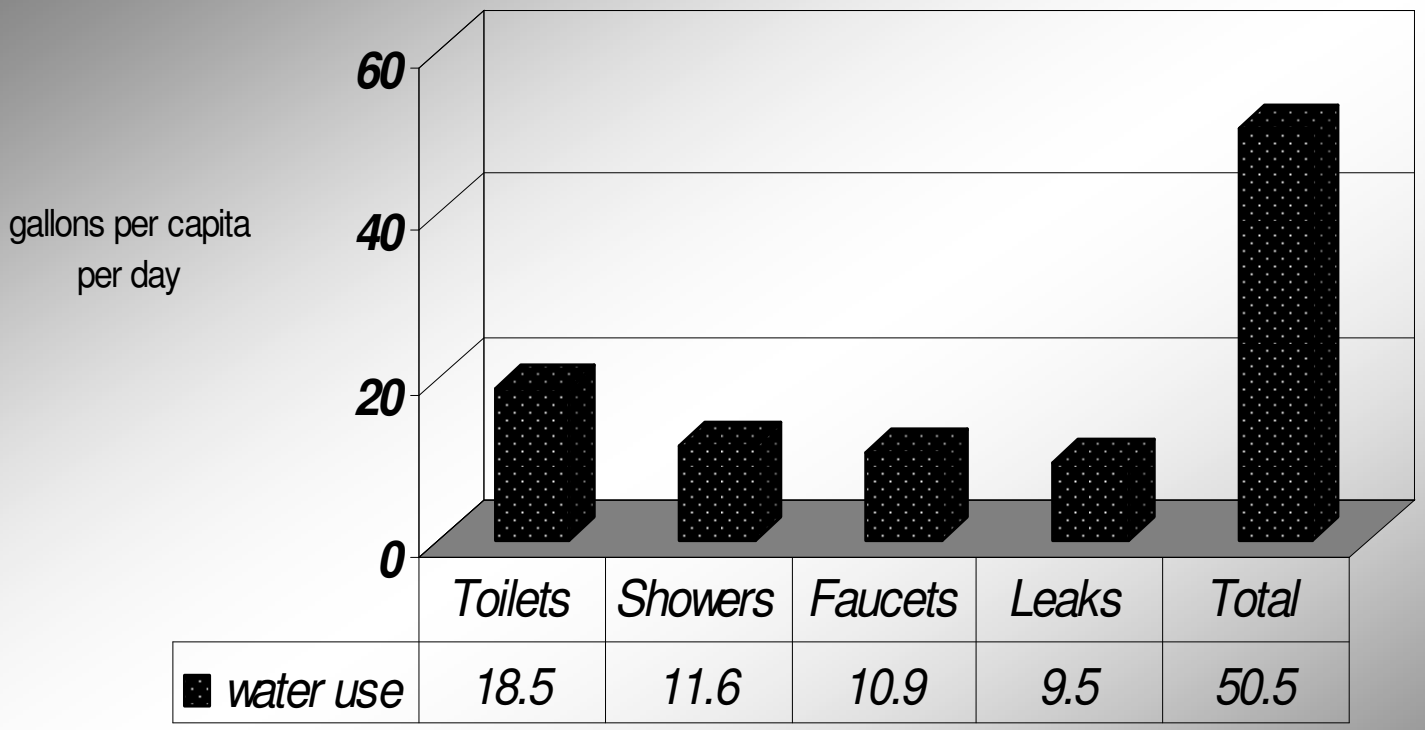
Contents

- Sanitary Uses
- Landscaping
- Rainwater
- General Cleaning
- Applications/ Summary

Water use in Non- conserving facilities



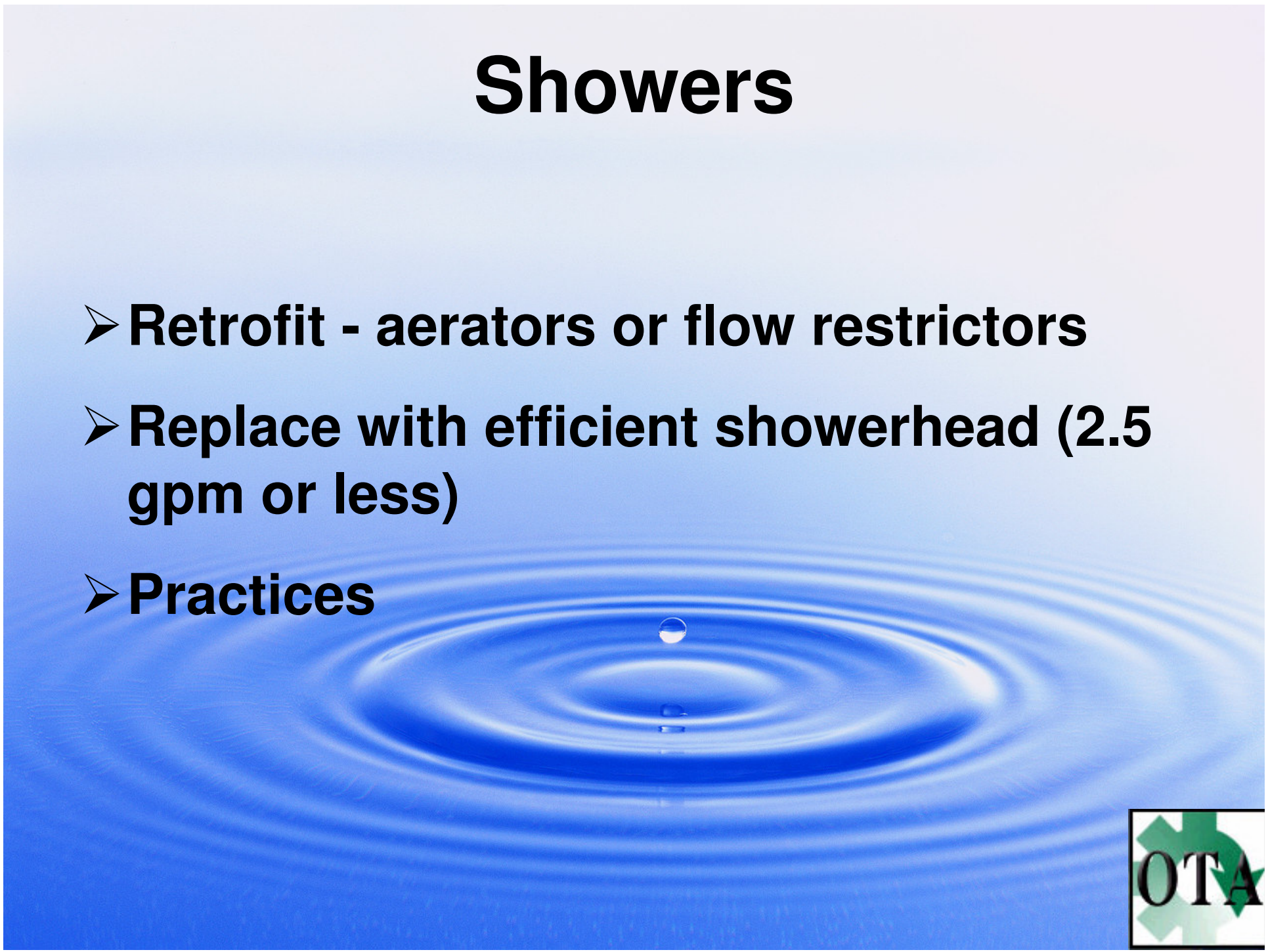
Source: adapted from Amy Vickers & Associates

Faucets

- Retrofit – laminar flow aerators or flow restrictors
- Automatic on and off self-closing systems
- Infrared sensors and ultrasonic faucets

Showers

- Retrofit - aerators or flow restrictors
- Replace with efficient showerhead (2.5 gpm or less)
- Practices



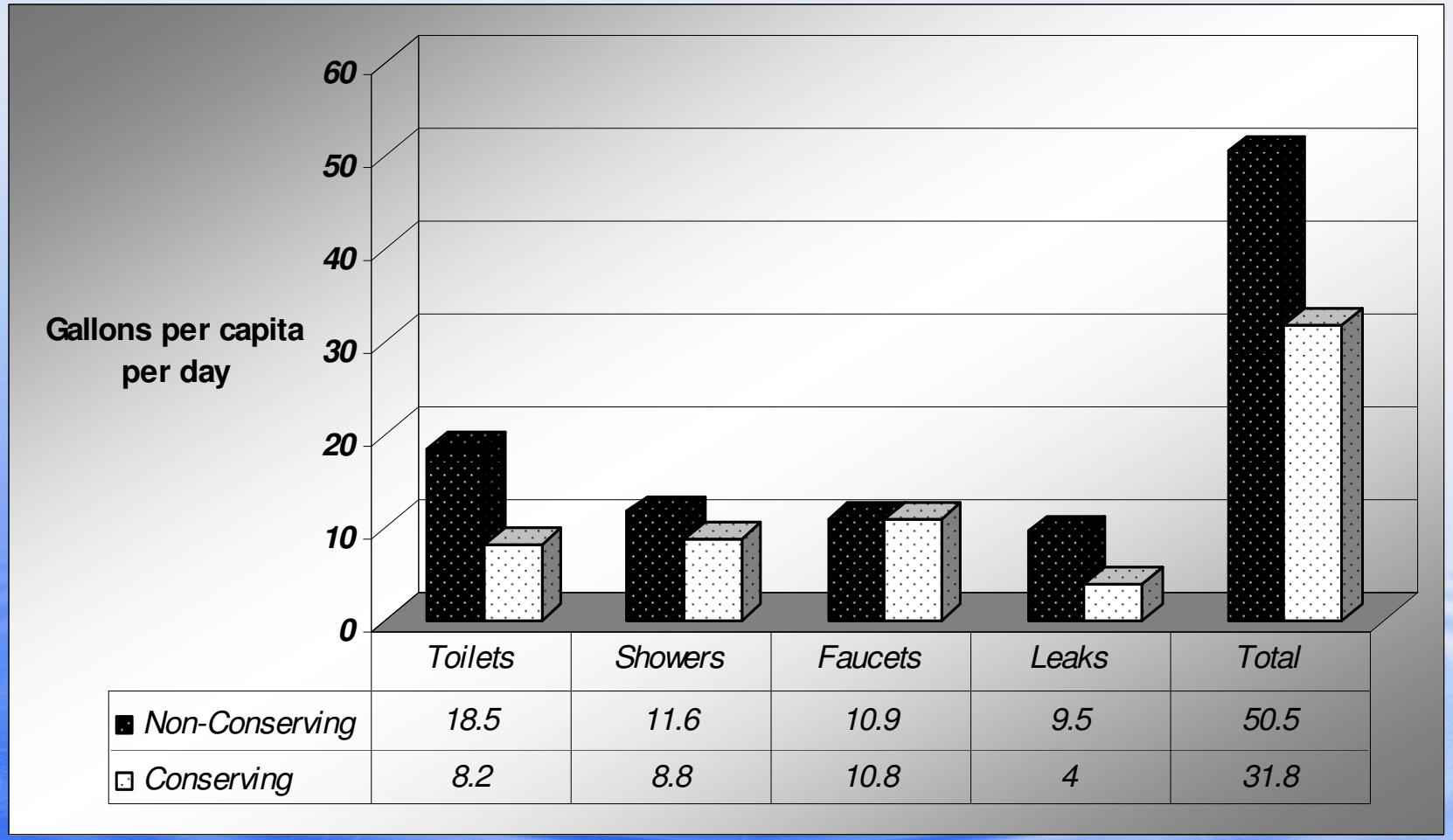
Toilets

- Displacement devices (bags or bottles)
- Replace the flush valves with early closure device
- Dual-flush adapters
- Replace older tanks and valve-type toilets with more efficient models

Urinals

- Retrofit siphonic jet urinals by installing timers
- For washout or washdown urinals retrofit or replace flushometer valve
- New models - ultralow-flush urinals or zero gpf non-water-using urinal

Water usage: conserving vs. non-conserving

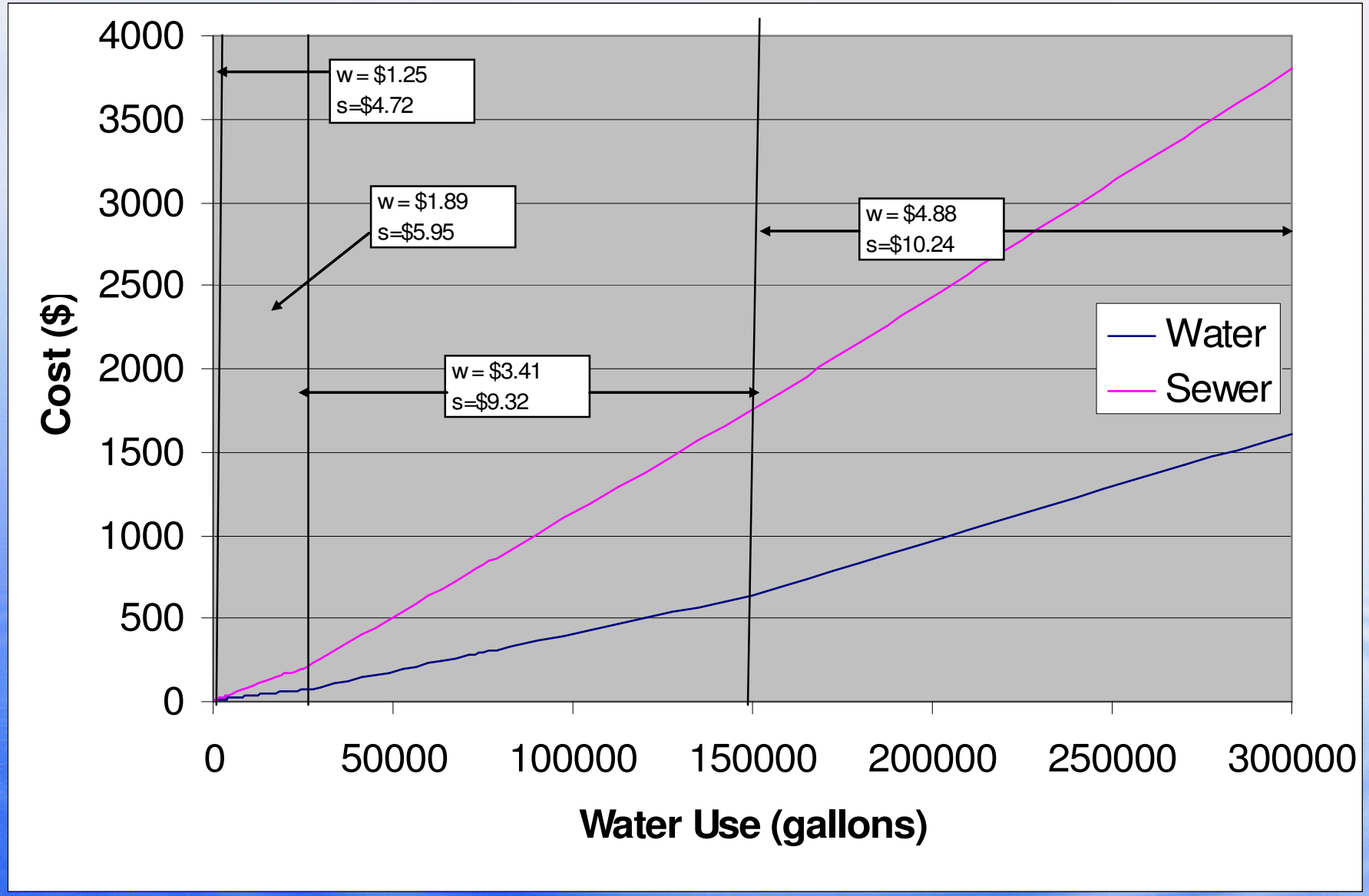


	Toilets	Showers	Faucets	Leaks	Total
Non-Conserving	18.5	11.6	10.9	9.5	50.5
Conserving	8.2	8.8	10.8	4	31.8

Source: adapted from Amy Vickers & Associates

Variable Rates (Braintree)

	Water	Sewer
Base charge	$11.25	$11.25
0 - 3,750 Gallons (G)	$1.25/HCF	$4.72/HCF
3,750 - 26,250 G	$1.89/HCF	$5.95/HCF
26,250 - 150,000 G	$3.41/HCF	$9.32/HCF
> 150,000 G	$4.88/HCF	$10.24/HCF


4000
3500
3000
2500
2000
1500
1000
500
0
Cost ($)
w = $1.25
s=$4.72
w = $1.89
s=$5.95
w = $3.41
s=$9.32
w = $4.88
s=$10.24
Water
Sewer
0
50000
100000
150000
200000
250000
300000
Water Use (gallons)

Estimated non-residential water Savings

	Ave.
Wholesale Establishment	**14250**
Automotive Business	**9000**
Multiple-Use Facility	**7250**
Manufacturing Site	**5750**
Health-Care facility	**5250**
Office	**5000**

Figures in gallons/year/1.6 gpf toilet, replacing a 3.5- 5.5 gpf toilet

Reference: CII ULFT Savings Study for California Urban Water conservation council – from Amy Vickers and associates

Landscaping: Practices

- Sweeping/vacuuming of surfaces
- Avoid excessive landscape fertilizing and pruning
- Regular weeding/ maintenance
- Mulching

Technological

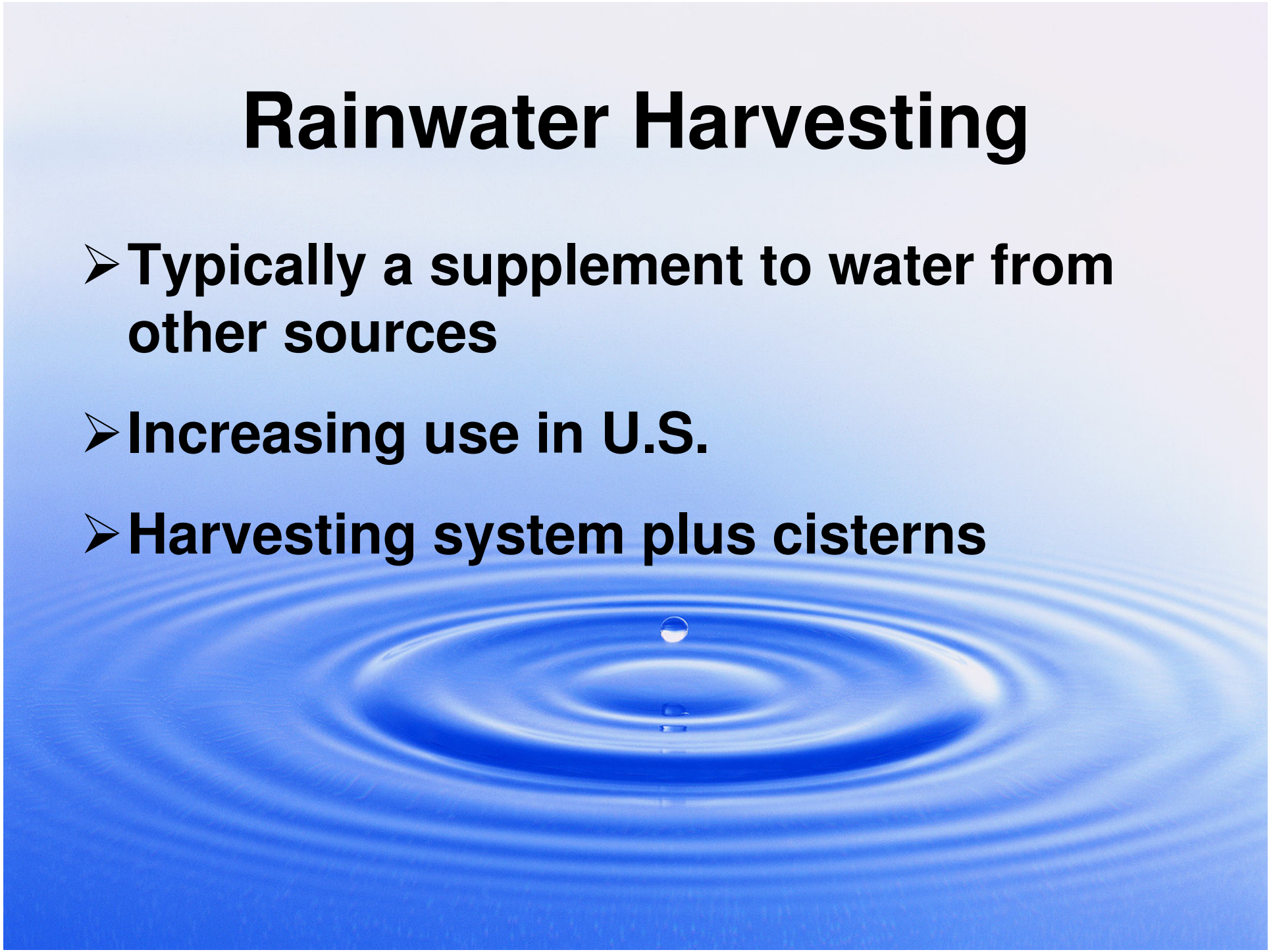
- Proper irrigation scheduling (timers)
- Soil moisture overrides on sprinkler systems
- Drip irrigation systems
- Proper siting and positioning of sprinklers (uniformity)
- Use of harvested water

“Xeriscaping”

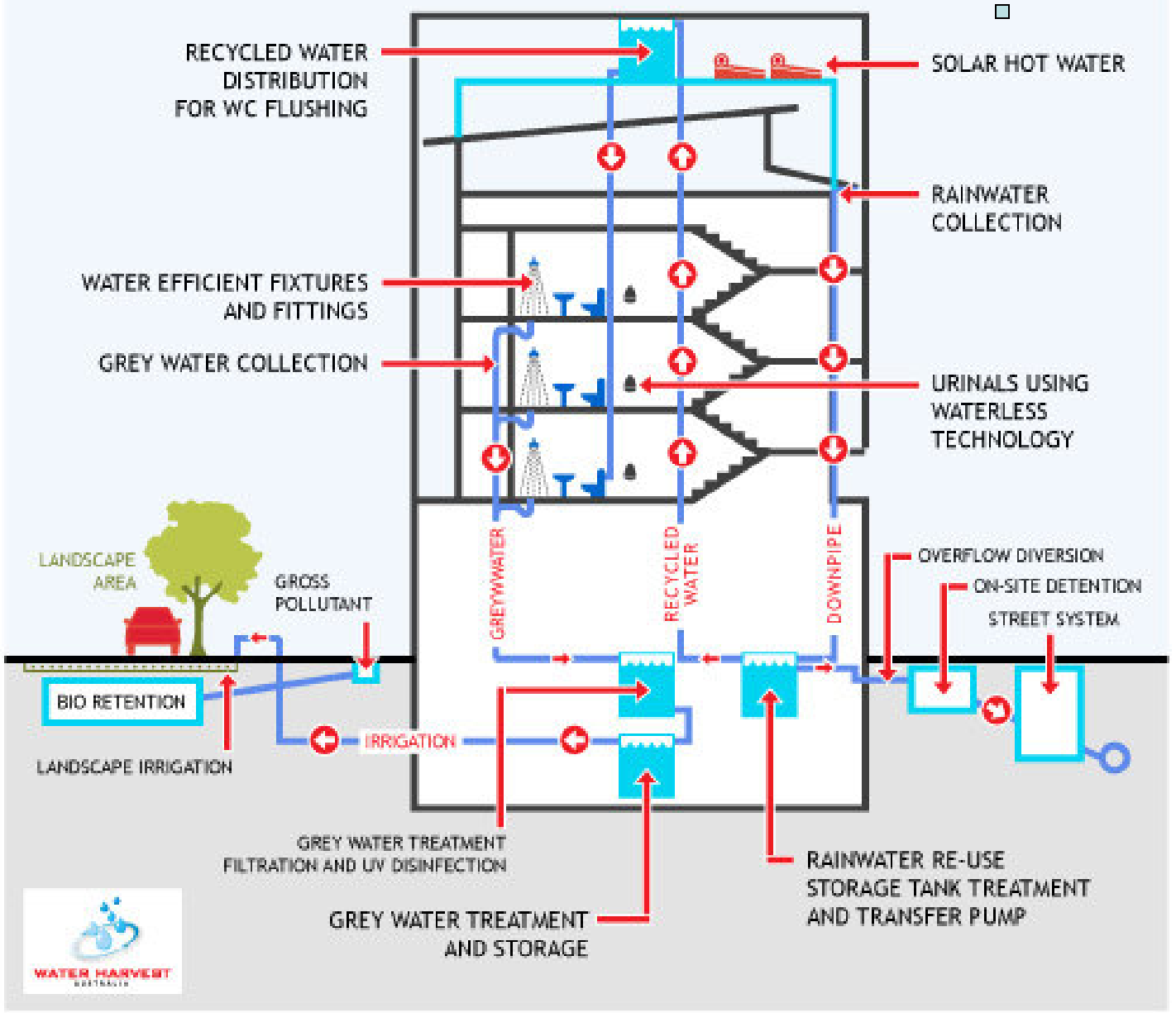
- Plant drought-resistant or native plants
- Minimize landscaping additions/alterations
- Design landscapes that require less water

Rainwater Harvesting

- Typically a supplement to water from other sources
- Increasing use in U.S.
- Harvesting system plus cisterns



WATER HARVEST AUSTRALIA
INTEGRATED WATER MANAGEMENT SYSTEMS - COMMERCIAL

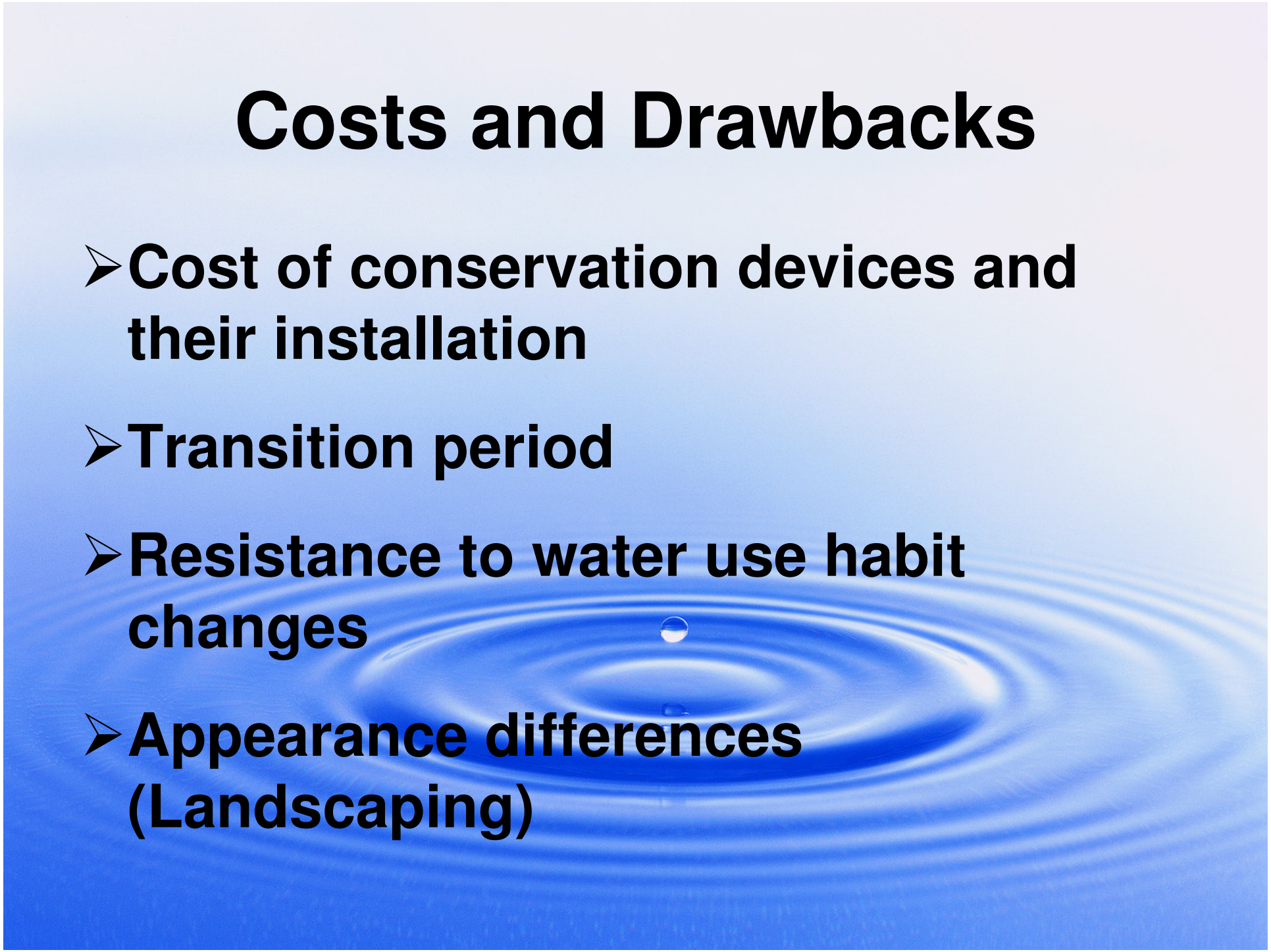


Cleaning

- Sweeping/shoveling as alternative to hosing down surfaces
- Improve efficiency of cleaning equipment: 2 gpm vs. 5 gpm nozzle
- Higher pressure, lower volume cleaning equipment
- Steam cleaners for heavier jobs
- Scheduling of cleaning activities
- Sufficient collection receptacles

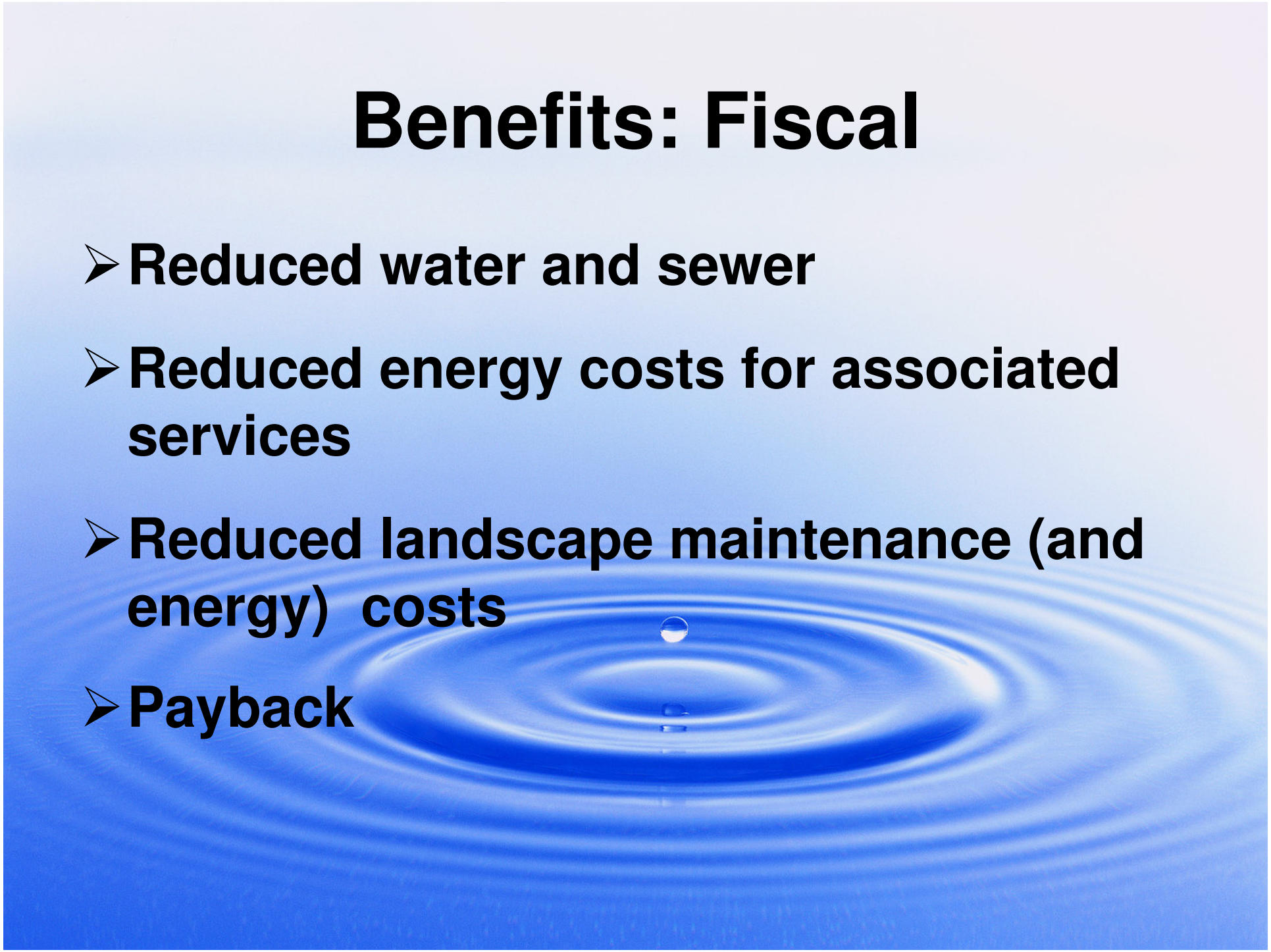
Costs and Drawbacks

- Cost of conservation devices and their installation
- Transition period
- Resistance to water use habit changes
- Appearance differences (Landscaping)



Benefits: Fiscal

- Reduced water and sewer
- Reduced energy costs for associated services
- Reduced landscape maintenance (and energy) costs
- Payback



Benefits: Infrastructure

- Peak water demand reduction
- Smaller/ fewer water supply facilities
- Reduced need for construction of alternate supply systems
- Extended (landscaping and water supply) equipment life
- Improved safe yield and reliability of wells
- Reduced demand on wastewater treatment facilities

Benefits: Intangibles

- Improved employee morale
- Setting community example
- Reduced water runoff/ soil erosion
- Reduced groundwater issues
- Improved plant diversity, habitat preservation, wetlands preservation
- Reduced air pollution/ carbon footprint
- Global warming effects

Useful Links/ Resources

- **OTA Water Conservation :**

  http://www.mass.gov/envir/ota/resources/water_conserv.htm

- **EPA Water Sense Program**

  http://www.epa.gov/owm/water-efficiency/index.htm

- **MWRA Rate Survey:**

  http://www.mwraadvisoryboard.com/Publications/Rate_Survey/2007_Survey.pdf

- **Vickers, A.: Handbook of Water Use and Conservation – (2001) Waterplow Press, Amherst, MA**

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